



NOTES

PREMATURE CONTRACTION

GENERALLY, WHAT IS IT?

PATHOLOGY & CAUSES

- Depolarizing potential from anywhere in heart other than sinoatrial (SA) node → contraction earlier than normal in cardiac cycle
- Triggered activity
 - Cells triggered by preceding action potential after repolarization
 - Cause: reperfusion therapy after myocardial infarction/digoxin toxicity
- Ectopic focus
 - Cells irritated by electrolyte imbalances, drugs, ischemic damage → increased sympathetic activity → enhanced automaticity → early depolarization
- Reentrant loop
 - Tissue unable to depolarize (e.g. scar tissue, amyloid) → no signal conduction → depolarizing wave obstructed → depolarizing wave circles tissue → abnormal electrical circuit

CAUSES

- Often idiopathic
- Electrolyte imbalances (hypokalemia, hypercalcemia, hypomagnesemia)
- Recreational/prescription drugs (methamphetamines, cocaine, digoxin intoxication)

- Alcohol use
- *Heart dilation*: cardiomyopathies, cor pulmonale
- *Heart scarring*: after myocardial infarction, myocarditis

COMPLICATIONS

- Rarely atrial/ventricular fibrillation

SIGNS & SYMPTOMS

- Usually asymptomatic
- *In case of frequent premature contractions*: lightheadedness, palpitations

DIAGNOSIS

OTHER DIAGNOSTICS

- ECG
- Holter monitor
- ZIO patch

TREATMENT

- See individual disorders

VISIT...

LANZAROTE
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PREMATURE ATRIAL CONTRACTION (PAC)

osms.it/premature-atrial-contraction

PATHOLOGY & CAUSES

- Contraction of atria earlier than normal in cardiac cycle
- **Atrial bigeminy**: premature atrial contraction consistently occurs after each normal cardiac cycle
- **Atrial trigeminy**: premature atrial contraction consistently occurs after every two normal cardiac cycles

CAUSES

- Heart structural disorders, intoxication, electrolyte imbalances

COMPLICATIONS

- Atrial fibrillation

SIGNS & SYMPTOMS

- Usually asymptomatic
- In case of frequent premature contractions: lightheadedness, palpitations

DIAGNOSIS

OTHER DIAGNOSTICS

ECG

- Early, abnormal P wave
 - Ectopic focus in bottom of atria → negative P wave
 - Ectopic focus closer to atrioventricular (AV) node → **PR interval shorter**
 - P wave, T wave overlap

- **Noncompensatory pause**
 - Premature impulse enters sinoatrial (SA) node → **shortens cycle**
 - Distinct from compensatory pause: premature ventricular contraction → premature impulse does not reach SA node → if AV node still refractory, pauses → **lengthens cycle**
- **Normal QRS**
 - Premature impulse reaches AV node in refractory → blocked premature atrial contraction → QRS nonexistent
- **Ashman phenomenon**
 - R-R interval prolongs → increases refractory period of right bundle branch → abnormal conduction of subsequent impulse → right bundle branch block on ECG
- **Holter monitor**
 - 24h, detect premature contractions

TREATMENT

- Typically requires no treatment

MEDICATIONS

- **If symptomatic**: beta blockers/calcium channel blockers
- Electrolyte replacement

SURGERY

- **If triggering atrial fibrillation**: radiofrequency catheter ablation

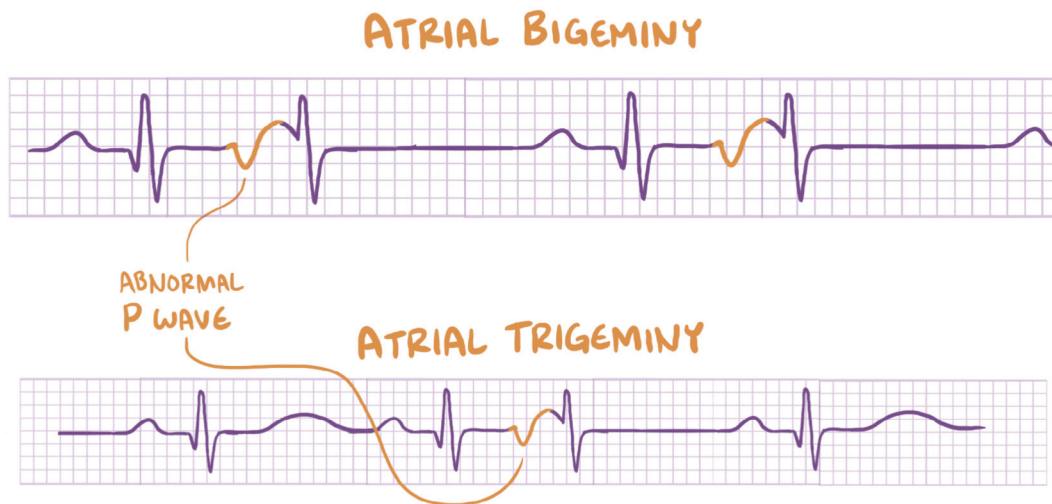


Figure 17.1 Illustration depicting abnormal P wave in atrial bigeminy and trigeminy.

PREMATURE ATRIAL CONTRACTION

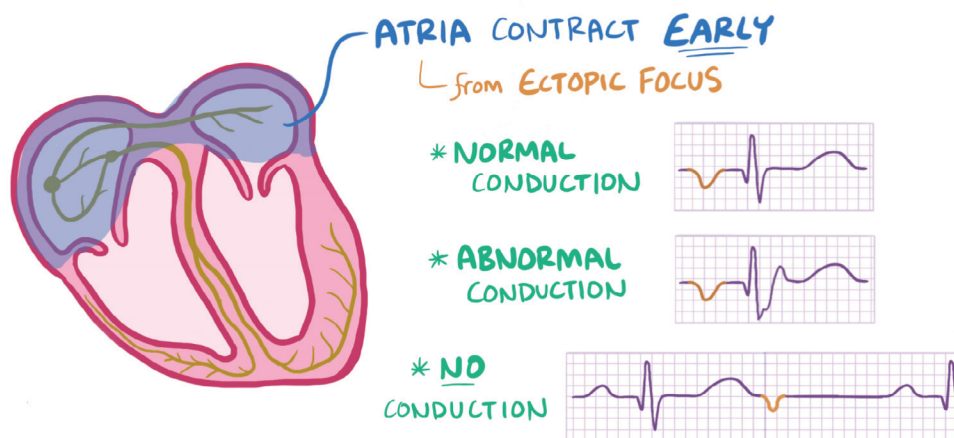


Figure 17.2 Illustration comparing normal ECG tracing vs ECG tracing with premature atrial contraction.

PREMATURE VENTRICULAR CONTRACTION (PVC)

osms.it/premature-ventricular-contraction

PATHOLOGY & CAUSES

- Contraction of ventricles earlier than normal in cardiac cycle
- Ectopic focus
 - **Latent pacemakers:** AV node, bundle of His/Purkinje fibers take over SA node's function of pacemaker
 - Irritated cardiac muscle cells → early depolarization
- Triggered activity
 - Ventricular repolarization → ventricle cells triggered by preceding action potential
 - **Cause:** reperfusion therapy after myocardial infarction/digoxin toxicity
- Reentrant loop
 - Tissue unable to depolarize (e.g. scar tissue, amyloid) → no signal conduction → depolarizing wave obstructed → depolarizing wave circles tissue → abnormal electrical circuit
- **Ventricular bigeminy:** premature ventricular contraction consistently comes after each normal cardiac cycle
- **Ventricular trigeminy:** premature ventricular contraction consistently comes after every two normal cardiac cycles

CAUSES

- Heart structural disorders, intoxication, electrolyte imbalances

RISK FACTORS

- Hypertension, smoking, exercise, stress, people of African descent (+30% risk), biological male

COMPLICATIONS

- Ventricular tachycardia, ventricular fibrillation, increased risk for sudden cardiac death

SIGNS & SYMPTOMS

- Can be asymptomatic
- Lightheadedness, palpitations

DIAGNOSIS

OTHER DIAGNOSTICS

ECG

- **Wide, bizarre QRS:** signal goes through ventricular muscle, not normal conduction pathway → **conduction is slower than normal**
- Ectopic impulse in right ventricle
 - Left bundle branch block pattern of QRS complex
 - **V1:** large negative complex, dominating S wave
- Ectopic impulse in left ventricle
 - Right bundle branch block pattern of QRS complex
 - **V1:** large positive complex, dominating R wave

- **Abnormal ST segments:** deviation from isoelectric baseline in opposite direction from QRS complex
- **Inverted T waves** in leads, QRS complex predominantly positive
- **Nonexistent P wave:** covered by wide QRS complex
 - QRS followed by compensatory pause
- **Ventricular fusion beat:** premature QRS complex occurs during PR segment, combines with normal depolarization wave
- **R-on-T phenomenon:** premature QRS complex occurs at/near T wave apex
- Holter monitor

TREATMENT

- Typically requires no treatment

MEDICATIONS

- **If symptomatic:** venodilators, calcium channel blockers, administer beta blockers with caution

SURGERY

- **If triggering ventricular arrhythmias:** radiofrequency catheter ablation to destroy ectopic focus/replacement if necessary

OTHER INTERVENTIONS

- If mild, no exercise restrictions; if severe, reduced physical activity

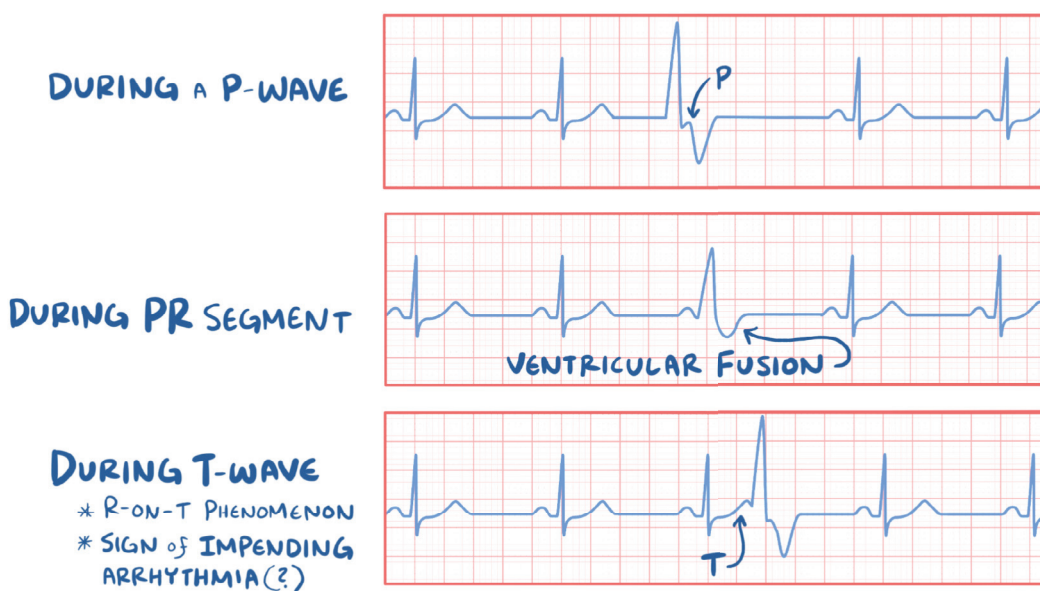


Figure 17.3 Illustration comparing premature ventricular contractions that occur during a P wave, during a PR segment, and during a T wave.

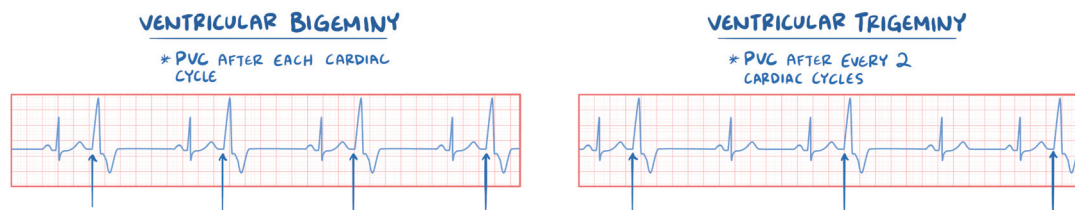


Figure 17.4 Illustration comparing ventricular bigeminy and trigeminy.